



**National Aeronautics and
Space Administration**

April 15, 1997

NRA-97-MTPE-04

RESEARCH ANNOUNCEMENT

**SCIENCE INVESTIGATIONS IN SUPPORT OF THE UPPER ATMOSPHERE
RESEARCH SATELLITE (UARS) MISSION**

Proposals Due June 16, 1997

OMB Approval No. 2700-0087

**SCIENCE INVESTIGATIONS IN SUPPORT OF THE UPPER
ATMOSPHERE RESEARCH SATELLITE (UARS) MISSION**

NASA Research Announcement

**NRA 97-MTPE-04
Issued April 15, 1997**

**Office of Mission to Planet Earth
National Aeronautics and Space Administration
Washington, DC 20546**

RESEARCH ANNOUNCEMENT FOR SCIENCE INVESTIGATIONS IN SUPPORT OF THE UPPER ATMOSPHERE RESEARCH SATELLITE (UARS) MISSION

This NASA Research Announcement (NRA) solicits proposals for data analysis and theoretical studies as an Investigator in the Upper Atmosphere Research Satellite (UARS) program.

The UARS was deployed on September 15, 1991 in a circular orbit at 600 km altitude and 57 degrees orbital inclination. The satellite contains 9 instruments that measure chemical composition, dynamics, and energy input in the form of solar ultraviolet radiation and energetic particle precipitation into the earth's upper atmosphere. The goal of the program is to improve understanding of the structure and behavior of the atmosphere between about 15 and 100 km altitude (i.e., the earth's stratosphere, mesosphere, and lower thermosphere) in order to understand and predict better the response of this sensitive part of the Earth system to natural changes and to changes resulting from human activities. Phenomena such as ozone depletion (the best-known example of which is the Antarctic ozone hole) and the possibility of global warming have called increasing attention to the causes and effects of changes in the earth's atmosphere in recent years. The UARS is a major NASA mission aimed at understanding these changes as they occur in and affect the upper atmosphere.

Data from the UARS observations are available to the public and are accessible through the Distributed Active Archive Center located at the Goddard Space Flight Center. Current observations are released to the DAAC monthly. In addition to the satellite data, some correlative data from balloon, aircraft, and ground-based platforms that are part of the UARS data base are also available.

UARS is currently operational. Flight operations for the satellite platform, instrument operations, algorithm maintenance and program management are funded separately from the investigations to be selected under this NRA. The current, selected institutions for the UARS experimental investigations will continue to be responsible for instrument operations and algorithm maintenance under the direction of the Principal Investigators. All funding for science investigations for the UARS program will, however, be provided through this NRA. The current UARS Principal Investigators, Co-Investigators, and Guest Investigators, who comprise the extended UARS Science Team, must propose in response to this NRA to continue any NASA-funded science investigations with the UARS data. Other parties not currently funded by the UARS program and who wish to apply for NASA funding for science investigations with the UARS data may also propose in response to this NRA.

This NRA does not solicit any additional experimental investigations, proposals for model development, or proposals to acquire data handling facilities or computers. Investigators should utilize existing data analysis techniques and theoretical models in their proposed

work and should have on hand the computing and communications facilities necessary for performing the proposed work.

Proposals should be submitted to the Science Division, Office for Mission to Planet Earth, National Aeronautics and Space Administration, Washington, D.C. 20546. After review and evaluation of the proposals received, a selection of investigations to be supported will be made by NASA Headquarters. Financial support of the selected U.S. investigations will be provided by NASA. The initial proposal review will be conducted in July, 1997 - August, 1997 with selection anticipated by early October, 1997. To allow adequate time for review and selection, proposals must be submitted by June 16, 1997.

Participation by non-U.S. investigators is encouraged with specific guidelines outlined in Enclosure B (VI) and Enclosure C. However, no NASA funding will be available to non-U.S. investigators. so non-U.S. proposals do not need to include cost information as described in Enclosure C (I). Non-U.S. investigators who propose and are selected through the same review process as U.S. investigators will become members of the extended UARS Science Team.

Funds for this program have not yet been appropriated; but , for planning purposes, NASA hopes to have approximately \$4.3 million per year for three years for support of investigations selected through this NRA. Because UARS is currently in extended operations, the funding available will be contingent upon continued success in extending the lifetime of the satellite and its instruments.

Prospective investigators should submit proposals stating their objectives, scientific rationale, methodology, management approach, and staffing and funding requirements, including any cost-sharing. Information and suggested guidelines for the preparation of proposals in response to this NRA are given in Enclosure B. Enclosure C contains general instructions for responding to NASA Research Announcements. Proposals should be for the period of time necessary to carry out the specific tasks proposed, but proposals will generally not be selected for a length of time greater than three years.

Identifier NRA-MTPE-04

Submit proposals to:

UARS Science Investigations Program
Code Y
400 Virginia Avenue SW, Suite 700
Washington, DC 20546

Proposals from outside the United States should be submitted according to the information in Appendix C, Section VI.

Selecting Official:

Dr. Robert C. Harriss
Director, Science Division
Code YSA
Office of Mission to Planet Earth
National Aeronautics and Space Administration
Washington, DC 20546

Obtain additional technical information from:

Dr. Robert J. McNeal
UARS Program Scientist
Science Division, Code YSA
National Aeronautics and Space Administration
Washington, DC 20546

202-358-0239
rmcneal@hq.nasa.gov

or

Dr. Mark R. Schoeberl
UARS Project Scientist
Code 910
Goddard Space Flight Center
Greenbelt, MD 20771

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Your interest and cooperation in participating in this opportunity are appreciated.

William F. Townsend
Associate Administrator for Mission to Planet Earth (Acting)

SCIENCE INVESTIGATIONS IN SUPPORT OF THE UPPER ATMOSPHERE RESEARCH SATELLITE (UARS) MISSION

Technical Description

There has been increasing concern in recent years about the sensitivity of the Earth's atmosphere to external influences associated both with changing natural phenomena and changes arising from by-products of various human activities. Long-standing curiosity about atmospheric evolution and the factors influencing climate and weather has been heightened by the discovery of such phenomena as the Antarctic ozone hole and the buildup of trace gases in the atmosphere that could produce global warming. These discoveries clearly indicate that human activities can lead to significant inadvertent atmospheric modification. Modifications are possible both in the lower and upper atmosphere, and can have enormous implications for the future of the planet. They highlight the need for a long-term program of scientific research directed toward improving knowledge of the physical and chemical processes occurring in the Earth's atmosphere.

The Upper Atmosphere Research Satellite (UARS) is an important NASA mission aimed at improving our knowledge of the atmosphere above the troposphere and mostly below the thermosphere, i.e., between about 15 and 100 km. This region is known to be especially susceptible to modification through human activity. UARS is providing a focus for the resolution of key scientific questions relating to the chemistry, dynamics, and overall energy balance of these regions. Through a combination of measurements, theoretical studies of basic processes, and large-scale modeling, scientific progress is being made through the UARS program toward solving some of the outstanding physical and chemical problems of the upper atmosphere. Extensive theoretical activity, coupled to data and model analysis, is an integral part of the program and has been since its inception.

Highlights of advances made with UARS data are available on the UARS web site (<http://www-uars.gsfc.nasa.gov/uars-science.html>). The web site includes synopses of selected results from each of the UARS instruments as well as a bibliography of journal publications.

The UARS Observatory consists of 9 scientific instruments and an instrument of opportunity not specifically related to UARS objectives. The UARS was deployed on September 15, 1991 from the Space Shuttle Discovery, launched from the Kennedy Space Center on September 12, 1991. The observatory is in a circular orbit at 600 km and inclined 57 degrees with respect to the Equator. At this altitude and inclination the remote sensors that view the atmosphere at an angle of 90 degrees with respect to the spacecraft velocity vector can see to 80 degrees latitude, providing nearly global coverage. This inclination also produces a precession of the orbit plane such that all local solar times are sampled in about 36 days. The spacecraft is yawed 180 degrees approximately every 36 days, so that high latitude coverage alternates between north and south.

The UARS program was originally projected to last 18 months with one year of extended operations. The satellite has now been operational for more than five

years, which has enabled science investigations beyond the scope of the original UARS goals. Investigations which exploit the unexpected duration of the UARS data set, such as analysis of trends and long time period variability, are key components of the UARS extended mission. Investigations consistent with continued progress toward the original goals and objectives of the program remain a part of the UARS extended mission.

The measurement capabilities of the 9 scientific instruments aboard UARS are described in Tables A-1, A-2, and A-3. These measurements include solar irradiance at ultraviolet and visible wavelengths; X-ray, proton, and electron fluxes; temperature and constituents; and two-component wind vectors. Data from these instruments are publicly available on the Distributed Active Archive Center (DAAC) at NASA Goddard Space Flight Center. Current and reprocessed data are transferred from the UARS Central Data Handling Facility (CDHF) to the DAAC at monthly intervals. For all instruments, except the three that measure the solar spectrum and energetic particle deposition, the archived data are altitude profiles (Level 3-A).

All users of the UARS data including investigators who are selected under this NRA should carefully examine quality flags on the UARS data sets. Responsibility for proper use of the data, including recognition of any limitations and potential errors rests with the investigator using the data. For some instruments, new algorithms are expected to be delivered on or before October 1, 1997, and subsequently older data will be reprocessed. No new algorithm deliveries from the science team are anticipated after October 1, 1997. The Principal Investigators for the instruments should be contacted with questions concerning the current algorithm, future delivery of an improved algorithm, and anticipated improvements.

The UARS data can be ordered from the Goddard DAAC via their on-line browse system. The address for inquiries is:

DAAC
User Services
Mail Code 902
NASA/Goddard Space Flight Center
Greenbelt, MD 20771
Phone 301-286-3209
http://daac.gsfc.nasa.gov/DAAC_DOCS/gdaac_home.html or
telnet daac.gsfc.nasa.gov
login: daacims
password: gsfcdaac

The United Kingdom Meteorological Office (UKMO) and the National Center for Environmental Protection (NCEP), formerly the National Meteorological Center (NMC), provide wind and temperature fields for the UARS observing period which are also available from the DAAC. A correlative measurements program, which included ground-based, balloon, aircraft, and shuttle observations, was conducted by the UARS Program in cooperation with NASA's Upper Atmosphere Research program. These data have been used by the instrument teams to validate the UARS observations (e.g., the Journal of Geophysical Research April 30, 1996 special issue "Evaluation of the UARS Data").

Applicants interested in utilizing correlative data associated with a particular UARS instrument should contact the instrument PI for information on the type and availability of correlative data.

As of March, 1997, seven of the UARS scientific instruments are still operational. The Improved Stratospheric and Mesospheric Sounder (ISAMS) experienced a chopper failure in July 1992 and has ceased obtaining atmospheric data. The Cryogenic Limb Array Etalon Spectrometer (CLAES) ran out of cryogen in May 1993, after completing its planned period of operations. The 183 GHz band on the Microwave Limb Sounder (MLS) which was used to retrieve stratospheric water vapor, failed in April 1993. All other instruments and the other channels on the MLS are fully operational.

As a result of problems with the satellite solar array drive, UARS has been operating since March 1995 with less power than is required to operate all of the instruments simultaneously. The reduced observing schedule limits process studies, but provides information necessary for the extended goals of the UARS mission. These goals include constituent trends, solar ultraviolet and particle measurements through a solar cycle, and observations of dynamic variability on semiannual, biannual, and longer time scales. Enclosure A provides a summary of the numbers of observation days for each of the instruments between December 31, 1994 and December 31, 1996 (Table A-4). Enclosure A also provides a listing of the UARS instrument teams (Tables A-1 to A-3) and a list of some special issues of various journals reporting UARS investigations (Table A-5).

Investigations are solicited by this NRA in all areas within the scientific scope of the UARS program, with particular emphasis on the extended mission goals that focus on trends and long-time-period variability. Examples of the kinds of studies that are presently underway are given below:

1. Responses to Energy Inputs - UARS provides accurate measurements of the spectrum of solar irradiance in the ultraviolet (UV) region where absorption by ozone is the primary energy source for the stratosphere and the mesosphere. UARS also provides measurements of precipitating protons, electrons, and accompanying x-rays which may cause stratospheric and mesospheric constituent changes. To date, UARS measurements span about half a sunspot cycle, from near solar maximum to solar minimum. These UARS data can be used to study short-term (days) to long-term (years) atmospheric variabilities caused by these energy inputs.
2. Photochemistry of the Ozone Layer - UARS measures the concentrations of a number of trace gases that are significant to the photochemistry of ozone. These measurements, combined with observations of temperature and UV radiation, are being used to test whether the observed distributions of various trace gases are in agreement with other observations and with theoretical predictions. Observations of wind and temperature may be combined with observations of constituents to provide important tests of photochemistry, especially in regions where the advective and photochemical contributions to constituent evolution are of similar magnitude. Observations in the polar regions and the variations in ozone loss in the southern and northern winters may clarify the differences which lead to an ozone hole in the southern hemisphere but limited ozone loss in the northern hemisphere. Comparison of the ensemble of UARS measurements of radicals, reservoirs, and long-lived species with model values provide the most rigorous tests of

model chemistry and transport. UARS observations provide information on the evolution of both the sulfate aerosol layer and polar stratospheric clouds, as well as their effects on stratospheric constituents.

3. Dynamics - Direct wind measurements on UARS provide a unique opportunity to study the dynamics of the middle atmosphere. Long term observations of winds in the stratosphere and mesosphere provide a basis for studying motion of varying time scales, and can be related in some cases to measurements of long-lived gases which are tracers of atmospheric motion. The global data that UARS is providing can be used to understand important radiative, dynamical, and chemical processes occurring in the middle atmosphere. This data can provide critical comparisons with global three-dimensional model simulations.

4. Algorithms - Algorithms have been developed to retrieve meaningful geophysical parameters from the direct observations made by the various instruments. The algorithms used for these retrievals will be finalized during the 1997 fiscal year. However, investigations which could lead to major improvements in retrieved species or to new data products may be proposed under this NRA. When appropriate, Level 1 radiances will be made available from the UARS Central Data Handling Facility (CDHF). Proposers for new algorithms which generate data products should be prepared to deliver the final version of their algorithm to the CDHF at the end of the proposing period. The algorithm must meet all the coding standards and system call requirements that the current algorithms meet. For further information on these standards and requirements pertaining to algorithms contact

Ms. Susan Laubert
Production Control Supervisor
UARS CDHF
NASA Goddard Space Flight Center
Greenbelt, MD 20771

(ph) 301-286-7009
slaubert@pop500.gsfc.nasa.gov

Proposals for investigations in response to this NRA are welcome in all of these areas. The above examples are not all-inclusive. Proposals in other areas of the UARS program science are also welcome. Proposers should show how their investigation would use the UARS data to advance toward the general goal of UARS, which is to obtain improved understanding of the chemistry, dynamics, and energy input into the upper atmosphere and the coupling among them, and/or to the studies of trends and longer-time period variability in chemistry, dynamics, and energy input now possible in extended operations.

ENCLOSURE A

Table A-1
UARS Energy Input Measurements

Table A-2
UARS Species and Temperature Measurements

Table A-3
UARS Wind Measurements

Table A-4
UARS Observations 12/31/94 - 12/31/96

Table A-5
Partial Bibliography

Table A-1
UARS Energy Input Measurements

<i>Instrument</i>		<i>Description and Primary Measurement</i>		<i>Investigator, Institution</i>
SOLSTICE-	Solar Stellar Intercomparison Experiment	o-	Full disk solar irradiance spectrometer incorporating stellar intercomparison	G. J. Rottman University of Colorado
		o-	Solar spectral irradiance 115-440 nm	
SUSIM-	Solar Ultraviolet Spectral Irradiance Monitor	o-	Full disk solar irradiance spectrometer incorporating onboard calibration	G. E. Brueckner Naval Research Laboratory (NRL)
		o-	Solar spectral irradiance 120-400 nm	
PEM-	Particle Environment Monitor	o-	Xray,proton,and electron spectrometers	J. D. Winningham Southwest Research Institute
		o-	In situ energetic electrons and protons; remote sensing of electron energy deposition	

Table A-2
UARS Species and Temperature Measurements

<i>Instrument</i>		<i>Description and Primary Measurement</i>	<i>Investigator, Institution</i>
CLAES -	Cryogenic Limb Array Etalon Spectrometer	<ul style="list-style-type: none"> o- Solid-cryogen cooled - Interferometer sensing atmospheric infrared emissions o- T, CF₂Cl₂, CFCI₃, ClONO₂, CH₄, N₂O₅, O₃, NO₂, N₂O, HNO₃, H₂O, and aerosols 	A..E. Roche, Lockheed Martin Palo Alto Research Laboratory
ISAMS -	Improved Strato- spheric and Meso- spheric Sounder	<ul style="list-style-type: none"> o- Mechanically cooled radiometer sensing atmospheric infrared emissions o- T, O₃, NO, NO₂, N₂O₅, N₂O, HNO₃, H₂O, CH₄, CO 	F.W. Taylor, Oxford University
MLS -	Microwave Limb Sounder	<ul style="list-style-type: none"> o- Microwave radiometer sensing atmospheric emissions o- ClO, O₃, H₂O, and HNO₃ 	J.W. Waters, Jet Propulsion Laboratory
HALOE -	Halogen Occultation Experiment	<ul style="list-style-type: none"> o- Gas filter/radiometer sensing sunlight occulted by the atmosphere o- HF, HCl, CH₄, H₂O, NO₂, O₃, NO, and aerosols 	J.M. Russell, Hampton University

Table A-3
UARS Wind Measurements

<i>Instrument</i>		<i>Description and Primary Measurement</i>		<i>Investigator, Institution</i>
HRDI-	High Resolution Doppler Inter- ferometer	o-	Fabry-Perot Spectrometer sensing atmospheric emission and scattering	P.B. Hays, University of Michigan
		o-	Two-component wind: 10-110 km	
WINDII-	Wind Imaging Interferometer	o-	Michelson interferometer sensing atmospheric emission and scattering	G. G. Shepherd, York University, Canada
		o-	Two-component wind: 80-110 km	

Table A-4
UARS Observations Dec. 31, 1994- Dec. 31, 1996
Number of days of observation

Date	Yaw	SSPP	HALOE	MLS	HRDI	WINDII	PEM
12/31/94-01/30/95	(S)	29	30	0	29	29	29
01/30/95-03/11/95	(N)	40	14	0	40	40	40
03/11/95-04/17/95	(S)	26	24	10	22	21	9
04/17/95-05/19/95	(N)	24	18	1	0	0	0
05/19/95-06/30/95	(S)	35	23	13	0	7	6
06/30/95-07/30/95	(N)	26	22	5	24	15	16
07/30/95-09/08/95	(S)	36	27	16	16	14	10
09/08/95-10/15/95	(N)	33	37	19	18	26	19
10/15/95-11/16/95	(S)	27	28	28	21	20	10
11/16/95-12/27/95	(N)	41	24	31	23	29	22
12/27/95-01/26/96	(S)	30	28	17	17	30	11
01/26/96-03/05/96	(N)	28	17	24	11	25	6
03/05/96-04/11/96	(S)	36	35	29	19	13	13
04/11/96-05/14/96	(N)	29	29	22	15	19	11
05/15/96-06/24/96	(S)	39	18	20	15	14	26
06/24/96-07/24/96	(N)	26	24	18	9	12	6
07/24/96-09/02/96	(S)	34	12	10	10	10	6
09/02/96-10/09/96	(N)	35	33	11	15	12	7
10/09/96-11/11/96	(S)	33	21	27	5	10	8
11/11/96-12/22/96	(N)	41	21	10	5	29	18
12/22/96-12/31/96*	(S)	9	4	6	0	0	4

** This south-viewing period continued until 01/20/97.
Instrument operation figures for this period apply to the observations through 12/31/96.*

Table A-5
Partial Bibliography*

Reber, C. A., The Upper Atmosphere Research Satellite, EOS Transactions, American Geophysical Union **71**, 1867-8, 1873-4 (1990)

Geophysical Research Letters (special UARS issue), June, 1993.

Journal of Geophysical Research, special UARS issue, June, 1993.

Journal of the Atmospheric Sciences, special UARS issue, October, 1994.

Journal of Geophysical Research, Evaluation of the UARS Data, Special Issue, April, 1996.

**The references in this Table provide some general information, an overview of some UARS results, and extensive information on the instruments and their validation. The UARS web site contains a complete bibliography of the extensive literature on UARS.*

ENCLOSURE B

GUIDELINES FOR PARTICIPATION IN THE SCIENCE INVESTIGATOR PROGRAM IN SUPPORT OF THE UPPER ATMOSPHERE RESEARCH SATELLITE (UARS) MISSION

I. PURPOSE

These guidelines contain information regarding the goals and philosophy of NASA for the Upper Atmosphere Research Satellite (UARS) Science Investigator Program. Suggested format and mailing information for submission of proposals for research related to this program are also provided. Enclosure C contains general instructions for responding to NASA Research Announcements. Where conflicts exist between this Enclosure and Enclosure C, this Enclosure shall be the controlling document.

II. GUIDELINES FOR PARTICIPATION

This Research Announcement invites proposals for scientific investigations using all or part of the UARS data. This program will foster the continued use of UARS measurements by a broad scientific community to study the dynamics, photochemistry, radiative processes, and energy inputs of the upper atmosphere. This program will support efforts in data analysis and modeling studies which are directed towards these scientific goals. Development of computer models, purchase of computer facilities to access and use the UARS data, and field measurements for validation or correlative purposes will not be supported by this Science Investigator Program.

Meetings and workshops of the UARS Science Team on Science topics that will utilize the data are anticipated in the future. Science Investigators selected under the present Research Announcement will be expected to participate in such meetings, where they will have the same standing as the UARS Instrument Principal Investigators. Science Team meetings are held once per year. Estimated costs for Science Team participation should be included in the budgets of the proposals submitted in response to this Announcement. Awards under this program will be granted for periods up to three years.

III. SCHEDULE

Proposals in response to this NRA are due at NASA Headquarters by June 16, 1997. The review of these submissions will be completed during July, and August, 1997, with final selection anticipated by early October, 1997. Funding is anticipated to begin on or after November 1, 1997. Late proposals will be considered only if the selecting official deems them to offer NASA a significant technical advantage or cost reduction over proposals submitted by or before the deadline.

IV. PROPOSAL CONTENT AND FORMAT

The content of the proposal should provide sufficient detail to enable a reviewer to assess the value of the proposed research, its relation to the UARS objectives, and the probability that the investigators will be able to accomplish the stated objectives within the requested resources. The technical part of the proposal should be limited to the equivalent of 10 single-spaced typewritten pages. Additional pertinent information including publications, data, etc., may be added as attachments. Each proposal should contain the following material assembled in the order given:

A. Cover Letter:

Each proposal should be prefaced by a cover letter signed by an official of the investigator's organization who is authorized to legally bind the organization to the proposal and its content (unless the signature appears on the proposal itself). The cover letter should refer to the UARS Science Investigator Program.

B. Title Page:

The title page should contain the following:

1. A short descriptive title for the proposed effort.
2. Name of the proposing organization(s).
3. Names, full addresses, telephone numbers, and affiliations of the Principal Investigator and all Co-Investigators.
4. Date of submission.
5. Total cost.

C. Abstract Page:

This shall contain a brief statement of the objective of the proposed effort and method of approach.

D. Table of Contents:

This facilitates the review of proposals.

E. Description of Proposed Research:

This section should include the following parts:

1. An introduction:

This should clearly define the scientific objectives of the proposed effort. Background material and the scientific justification and rationale for the effort should be included.

2. A description of the proposed work:

This description should be a full statement of the work proposed with the key elements clearly identified and related to each other. The methods or approaches to be used should be

clearly described and, as appropriate, the advantages of the selected methods or approaches over alternative ones should be discussed. The anticipated results should be identified and their relation to the stated research objectives should be discussed.

3. A discussion of the importance of the anticipated results:

This discussion should be within the context of the goals of this program as outlined in section II above.

F. Management Approach:

The Management Plan should outline the specific responsibilities of the Principal Investigator (PI) and all other members of the group, and indicate the relationships of these responsibilities within the group. The Management Plan should also identify modeling tools available to the investigators and computer usage plans. The plan should identify what contractor and/or non-institution support is anticipated and who will be providing it.

G. Cost Plan: (US proposals only.)

This should be prepared according to the guidelines of the institution submitting the proposal. Separate budgets should be shown for each year. This cost plan should include:

1. Cost estimates for direct labor, including individual staff-months and rates for all personnel.
2. Estimated costs for computer services.
3. Travel costs: itemize trips; assume participation in the UARS Science Team meetings as discussed in Section II of this Appendix.
4. Overhead rates and costs.
5. Other costs, with explanation. Itemize items over \$500.
6. Contribution from any cost-sharing plan or other support for the proposed research.
7. Itemized list of the amount of any contractor or non-institution related activities to be supported as part of the proposed investigation.
8. Current research funding from other sources, including level of this funding and the title or brief description of this research.
9. Total cost of support being requested from NASA under this program.

H. Enclosures:

Include appropriate descriptions of available facilities, resumes of investigators, bibliographies and such other materials as desired.

V. EVALUATION CRITERIA The following criteria replace paragraph 13 of Enclosure C, and will be used in evaluating proposals. Approximately 70% of the total weighting of individual proposals will be based on Criteria A, B, and C below. Approximately 30% of the total weighting of individual proposals will be based on Criteria D, E and F below.

- A. The overall scientific merit of the investigation.
- B. The technical feasibility of accomplishing the stated scientific goals.
- C. The relevance of the proposed research to the UARS mission.
- D. The competence and relevant experience of the principal investigator and any collaborators as an indication of their ability to carry the investigation to a successful conclusion within the requested resources.
- E. The reputation and interest of the investigator's institution and the willingness of the institution to provide the necessary support to ensure that the investigation can be completed satisfactorily.
- F. The cost of the proposed effort including consideration of the realism and reasonableness of the proposed cost and the relationship of the proposed cost to available funds.

VI. PROPOSAL SUBMISSION INFORMATION

Ten copies of the proposal should be submitted. One copy should be of a quality suitable for reproduction and bear original signatures. Proposals must be typewritten in English, and they should be sent to:

UARS Science Investigator Program
Code Y
400 Virginia Avenue SW, Suite 700
Washington, DC 20546

Non-U.S. proposers should submit an additional copy to:

Office of External Relations
Mission to Planet Earth Division Code IY
National Aeronautics and Space Administration
Washington, DC 20546 USA

Non-U.S. proposers must have their proposals reviewed and endorsed by their appropriate non-U.S. government agency. Non-U.S. proposals received by the NASA Office of External Relations will go through the same evaluation and selection process as US-originated proposals. If a non-U.S. proposal is selected, NASA will make cooperative (no-

exchange-of-funds) arrangements with the sponsoring non-U.S. agency for the proposed participation, in which NASA and the sponsoring agency will each bear the cost of discharging their respective responsibilities.

**INSTRUCTIONS FOR RESPONDING TO
NASA RESEARCH ANNOUNCEMENTS
(JUNE 1995)**

1. Foreword

a. These instructions apply to NASA Research Announcements. The "NASA Research Announcement (NRA)" permits competitive selection of research projects in accordance with statute while preserving the traditional concepts and understandings associated with NASA sponsorship of research.

b. These instructions are Appendix I to 1870.203 of the NASA Federal Acquisition Regulation Supplement.

2. Policy

a. Proposals received in response to an NRA will be used only for evaluation purposes. NASA does not allow a proposal, the contents of which are not available without restriction from another source, or any unique ideas submitted in response to an NRA to be used as the basis of a solicitation or in negotiation with other organizations, nor is a pre-award synopsis published for individual proposals.

b. A solicited proposal that results in a NASA award becomes part of the record of that transaction and may be available to the public on specific request; however, information or material that NASA and the awardee mutually agree to be of a privileged nature will be held in confidence to the extent permitted by law, including the Freedom of Information Act.

3. Purpose

These instructions supplement documents identified as "NASA Research Announcements." The NRAs contain programmatic information and certain requirements which apply only to proposals prepared in response to that particular announcement. These instructions contain the general proposal preparation information which applies to responses to all NRAs.

4. Relationship to Award

a. A contract, grant, cooperative agreement, or other agreement may be used to accomplish an effort funded in response to an NRA. NASA will determine the appropriate instrument.

b. Grants are generally used to fund basic research in educational and nonprofit institutions, while research in other private sector organizations is accomplished under contract. Contracts resulting from NRAs are subject to the Federal Acquisition Regulation and the NASA FAR Supplement (NHB 5100.4). Any resultant grants or cooperative agreements will be awarded and administered in accordance with the NASA Grant and Cooperative Agreement Handbook (NHB 5800.1).

5. Conformance to Guidance

a. NASA does not have mandatory forms or formats for preparation of responses to NRAs; however, it is requested that proposals conform to the guidelines in these instructions. NASA may accept proposals without discussion; hence, proposals should initially be as complete as possible and be submitted on the proposers' most favorable terms.

b. In order to be considered responsive, a submission must, at a minimum, present a specific project within the areas delineated by the NRA; contain sufficient technical and cost information to permit a meaningful evaluation; be signed by an official authorized to legally bind the submitting organization; not merely offer to perform standard services or to just provide computer facilities or services; and not significantly duplicate a more specific current or pending NASA solicitation.

6. NRA-Specific Items

a. Several proposal submission items appear in the NRA itself. These include: the unique NRA identifier; when to submit proposals; where to send proposals; number of copies required; and sources for more information. Items included in these instructions may be supplemented by the NRA.

7. Proposal Contents

a. The following information is needed in all proposals in order to permit consideration in an objective manner. NRAs will generally specify topics for which additional information or greater detail is desirable. Each proposal copy shall contain all submitted material, including a copy of the transmittal letter if it contains substantive information.

b. Transmittal Letter or Prefatory Material

(1) The legal name and address of the organization and specific division or campus identification if part of a larger organization;

(2) A brief, scientifically valid project title intelligible to a scientifically literate reader and suitable for use in the public press;

(3) Type of organization: e.g., profit, nonprofit, educational, small business, minority, women-owned, etc.;

(4) Name and telephone number of the principal investigator and business personnel who may be contacted during evaluation or negotiation;

(5) Identification of other organizations that are currently evaluating a proposal for the same efforts;

(6) Identification of the NRA, by number and title, to which the proposal is responding;

(7) Dollar amount requested, desired starting date, and duration of project;

(8) Date of submission; and

(9) Signature of a responsible official or authorized representative of the organization, or any other person authorized to legally bind the organization (unless the signature appears on the proposal itself).

c. Restriction on Use and Disclosure of Proposal Information

Information contained in proposals is used for evaluation purposes only. Offerors or quoters should, in order to maximize protection of trade secrets or other information that is confidential or privileged, place the following notice on the title page of the proposal and specify the information subject to the notice by inserting appropriate identification, such as page numbers, in the notice. In any event, information contained in proposals will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the notice.

NOTICE

Restriction on Use and Disclosure of Proposal Information. The information (data) contained in [insert page numbers or other identification] of this proposal constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided, however, that in the event a contract (or other agreement) is awarded on the basis of this proposal the Government shall have the right to use and disclose this information (data) to the extent provided in the contract (or other agreement). This restriction does not limit the Government's right to use or disclose this information (data) if obtained from another source without restriction.

d. Abstract.

Include a concise (200-300 word if not otherwise specified in the NRA) abstract describing the objective and the method of approach.

e. Project Description.

(1) The main body of the proposal shall be a detailed statement of the work to be undertaken and should include objectives and expected significance; relation to the present state of knowledge; and relation to previous work done on the project and to related work in progress elsewhere. The statement should outline the plan of work, including the broad design of experiments to be undertaken and a description of experimental methods and procedures. The project description should address the evaluation factors in these instructions and any specific factors in the NRA. Any substantial collaboration with individuals not referred to in the budget or use of consultants should be described. Subcontracting significant portions of a research project is discouraged.

(2) When it is expected that the effort will require more than one year for completion, the proposal should cover the complete project to the extent that it can be reasonably anticipated. Principal emphasis should, of course, be on the first year of work, and the

description should distinguish clearly between the first year's work and work planned for subsequent years.

f. Management Approach.

For large or complex efforts involving interactions among numerous individuals or other organizations, plans for distribution of responsibilities and arrangements for ensuring a coordinated effort should be described. Intensive working relations with NASA field centers that are not logical inclusions elsewhere in the proposal should be described.

g. Personnel.

The principal investigator is responsible for supervision of the work and participates in the conduct of the research regardless of whether or not compensated under the award. A short biographical sketch of the principal investigator, a list of principal publications and any exceptional qualifications should be included. Omit social security number and other personal items which do not merit consideration in evaluation of the proposal. Give similar biographical information on other senior professional personnel who will be directly associated with the project. Give the names and titles of any other scientists and technical personnel associated substantially with the project in an advisory capacity. Universities should list the approximate number of students or other assistants, together with information as to their level of academic attainment. Any special industry- university cooperative arrangements should be described.

h. Facilities and Equipment.

(1) Describe available facilities and major items of equipment especially adapted or suited to the proposed project, and any additional major equipment that will be required. Identify any Government-owned facilities, industrial plant equipment, or special tooling that are proposed for use.

(2) Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already within the organization is a feasible alternative. Where such arrangements cannot be made, the proposal should so state. The need for items that typically can be used for research and non-research purposes should be explained.

I. Proposed Costs.

(1) Proposals should contain cost and technical parts in one volume: do not use separate "confidential" salary pages. As applicable, include separate cost estimates for salaries and wages; fringe benefits; equipment; expendable materials and supplies; services; domestic and foreign travel; ADP expenses; publication or page charges; consultants; subcontracts; other miscellaneous identifiable direct costs; and indirect costs. List salaries and wages in appropriate organizational categories (e.g., principal investigator, other scientific and engineering professionals, graduate students, research assistants, and technicians and other non-professional personnel). Estimate all manpower data in terms of man-months or fractions of full-time.

(2) Explanatory notes should accompany the cost proposal to provide identification and estimated cost of major capital equipment items to be acquired; purpose and estimated number and lengths of trips planned; basis for indirect cost computation (including date of most recent negotiation and cognizant agency); and clarification of other items in the cost proposal that are not self-evident. List estimated expenses as yearly requirements by major work phases. (Standard Form 1411 may be used).

(3) Allowable costs are governed by FAR Part 31 and the NASA FAR Supplement Part 18-31 (and OMB Circulars A-21 for educational institutions and A-122 for nonprofit organizations).

j. Security.

Proposals should not contain security classified material. If the research requires access to or may generate security classified information, the submitter will be required to comply with Government security regulations.

k. Current Support.

For other current projects being conducted by the principal investigator, provide title of project, sponsoring agency, and ending date

l. Special Matters.

(1) Include any required statements of environmental impact of the research, human subject or animal care provisions, conflict of interest, or on such other topics as may be required by the nature of the effort and current statutes, executive orders, or other current Government-wide guidelines.

(2) Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal. Identify the cognizant Government audit agency, inspection agency, and administrative contracting officer, when applicable.

8. Renewal Proposals

a. Renewal proposals for existing awards will be considered in the same manner as proposals for new endeavors. A renewal proposal should not repeat all of the information that was in the original proposal. The renewal proposal should refer to its predecessor, update the parts that are no longer current, and indicate what elements of the research are expected to be covered during the period for which support is desired. A description of any significant findings since the most recent progress report should be included. The renewal proposal should treat, in reasonable detail, the plans for the next period, contain a cost estimate, and otherwise adhere to these instructions

b. NASA may renew an effort either through amendment of an existing contract or by a new award.

9. Length

Unless otherwise specified in the NRA, effort should be made to keep proposals as brief as possible, concentrating on substantive material. Few proposals need exceed 15-20 pages. Necessary detailed information, such as reprints, should be included as attachments. A complete set of attachments is necessary for each copy of the proposal. As proposals are not returned, avoid use of "one-of-a-kind" attachments: their availability may be mentioned in the proposal.

10. Joint Proposals

a. Where multiple organizations are involved, the proposal may be submitted by only one of them. It should clearly describe the role to be played by the other organizations and indicate the legal and managerial arrangements contemplated. In other instances, simultaneous submission of related proposals from each organization might be appropriate, in which case parallel awards would be made.

b. Where a project of a cooperative nature with NASA is contemplated, describe the contributions expected from any participating NASA investigator and agency facilities or equipment which may be required. The proposal must be confined only to that which the proposing organization can commit itself. "Joint" proposals which specify the internal arrangements NASA will actually make are not acceptable as a means of establishing an agency commitment.

11. Late Proposals

A proposal or modification received after the date or dates specified in an NRA may be considered if the selecting official deems it to offer NASA a significant technical advantage or cost reduction.

12. Withdrawal

Proposals may be withdrawn by the proposer at any time. Offerors are requested to notify NASA if the proposal is funded by another organization or of other changed circumstances which dictate termination of evaluation.

13. Evaluation Factors

a. Unless otherwise specified in the NRA, the principal elements (of approximately equal weight) considered in evaluating a proposal are its relevance to NASA's objectives, intrinsic merit, and cost.

b. Evaluation of a proposal's relevance to NASA's objectives includes the consideration of the potential contribution of the effort to NASA's mission

c. Evaluation of its intrinsic merit includes the consideration of the following factors, none of which is more important than any other:

(1) Overall scientific or technical merit of the proposal or unique and innovative methods, approaches, or concepts demonstrated by the proposal.

(2) Offeror's capabilities, related experience, facilities, techniques, or unique combinations of these which are integral factors for achieving the proposal objectives.

(3) The qualifications, capabilities, and experience of the proposed principal investigator, team leader, or key personnel critical in achieving the proposal objectives.

(4) Overall standing among similar proposals and/or evaluation against the state-of-the-art.

d. Evaluation of the cost of a proposed effort includes the realism and reasonableness of the proposed cost and the relationship of the proposed cost and available funds.

14. Evaluation Techniques

Selection decisions will be made following peer and/or scientific review of the proposals. Several evaluation techniques are regularly used within NASA. In all cases proposals are subject to scientific review by discipline specialists in the area of the proposal. Some proposals are reviewed entirely in-house, others are evaluated by a combination of in-house and selected external reviewers, while yet others are subject to the full external peer review technique (with due regard for conflict-of-interest and protection of proposal information), such as by mail or through assembled panels. The final decisions are made by a NASA selecting official. A proposal which is scientifically and programmatically meritorious, but not selected for award during its initial review, may be included in subsequent reviews unless the proposer requests otherwise.

15. Selection for Award

a. When a proposal is not selected for award, and the proposer has indicated that the proposal is not to be held over for subsequent reviews, the proposer will be notified. NASA will explain generally why the proposal was not selected. Proposers desiring additional information may contact the selecting official who will arrange a debriefing.

b. When a proposal is selected for award, negotiation and award will be handled by the procurement office in the funding installation. The proposal is used as the basis for negotiation. The contracting officer may request certain business data and may forward a model contract and other information which will be of use during the contract negotiation.

16. Cancellation of NRA

NASA reserves the right to make no awards under this NRA and to cancel this NRA. NASA assumes no liability for canceling the NRA or for anyone's failure to receive actual notice of cancellation. Cancellation may be followed by issuance and synopsis of a revised NRA, since amendment of an NRA is normally not permitted.

Appendix D

Certification Regarding Debarment, Suspension, and Other Responsibility Matters Primary Covered Transactions

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 34 CFR Part 85, Section 85.510, Participant's responsibilities. The regulations were published as Part VII of the May 26, 1988 Federal Register (pages 19160-19211). Copies of the regulation may be obtained by contracting the U.S. Department of Education, Grants and Contracts Service, 400 Maryland Avenue, S.W. (Room 3633 GSA Regional Office Building No. 3), Washington, DC. 20202-4725, telephone (202) 732-2505.

- (1) The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:
- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
 - (b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
 - (c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and
 - (d) Have not within three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.
- (2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Organization Name

PR/Award Number or Project Name

Name and Title of Authorized Representative

Signature

Date

Appendix D

Certification Regarding Drug-Free Workplace Requirements Grantees Other Than Individuals

This certification is required by the regulations implementing the Drug-Free Workplace Act of 1988, 34 CFR Part 85, Subpart F. The regulations, published in the January 31, 1989 Federal Register, require certification by grantees, prior to award, that they will maintain a drug-free workplace. The certification set out below is a material representation of fact upon which reliance will be placed when the agency determines to award the grant. False certification or violation of the certification shall be grounds for suspension of payments, suspension or termination of grants, or governmentwide suspension or debarment (see 34 CFR Part 85, Sections 85.615 and 85.620).

This grantee certifies that it will provide a drug-free workplace by:

- (a) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;
- (b) Establishing a drug-free awareness program to inform employees about -
 - (1) The dangers of drug abuse in the workplace;
 - (2) The grantee's policy of maintaining a drug-free workplace;
 - (3) Any available drug counseling, rehabilitation, and employee assistance programs; and
 - (4) The penalties that may be imposed upon employees for drug abuse violations in the workplace;
- (c) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (a);
- (d) Notifying the employee in the statement required by paragraph (a) that, as a condition of employment under the grant, the employee will -
 - (1) Abide by the terms of the statement; and
 - (2) Notify the employer of any criminal drug statute conviction for a violation occurring in the workplace no later than five days after such conviction;
- (e) Notifying the agency within ten days after receiving notice under subparagraph (d)(2) from an employee or otherwise receiving actual notice of such conviction;
- (f) Taking one of the following actions, within 30 days of receiving notice under subparagraph (d)(2) , with respect to any employee who is so convicted -
 - (1) Taking appropriate personnel action against such an employee, up to and including termination; or
 - (2) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency;
- (g) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraph (a), (b), (c), (e), and (f).

Organization Name

PR/Award Number or Project Name

Name and Title of Authorized Representative

Signature

Date

Appendix D

CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements.

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000, and not more than \$100,000 for each such failure.

Signature and Date

Name and Title of Authorized Representative

Organization Name